

# Evaluation of Hospital Information System Performance from the Perspective of Users in Educational Hospitals

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## Summary

Hospital information systems (HIS) are electronic instrument that collect, classify, store and keep the financial, administrative and clinical data of patients and retrieve them using the capabilities of the computer and makes it available for the managers and decision makers at any time and place. Evaluation of hospital information system is a complex task in which all human, technical and organizational aspects should be considered. Lack of evaluation can be related to a lack of understanding the potential benefits of information systems; therefore, this study aims to evaluate the performance of the hospital information system from a user perspective. The present study was done in the descriptive-analytical method in tow educational hospitals (Kowsar and Amiralmomenin hospitals) in Semnan University of Medical Sciences, in Iran in 2017. The study population comprised of all users and experts of HIS system in the hospital. Data analysis was performed using descriptive and inferential statistics by SPSS19. The level of significance was considered 0.05 in this study. 83 questionnaires (97.6%) were collected out of the 85 questionnaires distributed. 71.4% of respondents had good and excellent computer skills. 69 (83.1%) considered learning how to use the system in the hospital before the launching it by the experts of the given company. The most weight average was elated to improvement of data exchange among wards ( $0.965 \pm 3.78$ ), reduction in staff travel among wards ( $0.820 \pm 3.98$ ) and instant access to patient records ( $0.884 \pm 4.14$ ). 66.7% stated that running HIS reduces bureaucracy and paper savings compared to before. Using one-way ANOVA, a significant relationship was observed between the levels of awareness of users about the hospital information system with education level ( $P=0.001$ ). Due to the advancement and wider developments in the field of medical information technology and increasing patient expectations, increasing demand to use hospital information systems have emerged in hospital. Hospitals that have not such systems in the twenty-first century will not have the ability to compete with other hospitals. Hence, it can be said that

knowledge and understanding of users is the first key to the implementation of hospital information systems.

## Key words:

*Hospital Information System, HIS, Evaluation*

## 1. Introduction

Nowadays, advanced computer technology is known as a safe and effective tool to integrate various software applications in healthcare environments. Hence, hospital information system (HIS) is an electronic instrument that collects, classifies, stores the financial, administrative and clinical data of patients, and retrieves them using the capabilities of the computer, and makes it available to the managers and decision makers at any time and place (7, 8). In other words, the hospital information system is defined as comprehensive software to integrate the data about the patients to send and exchange patients' comprehensive information among wards and other healthcare centers to accelerate the process of caring and treating the patient, to improve the quality and increase the satisfaction and reducing the costs (1).

A complex organization with multiple parts, such as hospital needs to access to information. Computer use is the only way for the collection, storage, communicating and presenting large amounts of information. (2) This led to the fact that the request to use hospital information system in the Ministry of Health and the insurance organizations are increasing day by day. Hospital information systems are frequently created, designed and used, but supporters of the information and communication technology undermined the need to assess the systems independently (3).

Evaluation of hospital information system is a complex task in which all human, technical and organizational aspects should be considered. Lack of assessment can be related to lack of understanding the potential benefits of information systems, thus to achieve the maximum benefits of the information system, the system must be evaluated according to certain criteria and requirements (4).

In a study by the Littlejohnset al., on computer integrated systems in Limbu, South Africa, said that improvement and the performance of the system that will maintain the confidentiality of information, standardization of patient management processes and increasing the income of the hospital as the strength of the system (6). In another study by Amir-Esmaili et al., on determining the indicators of hospital information systems evaluation in Kerman University of Medical Sciences, introduced factors such as quality of communication among different departments and structural architecture, quality of supporting workflow, output quality of the support, the system performance and user-friendly system by the users as the main indicators of a good system (1). Thus, the assessment of hospital information systems can be useful for researchers and designers of information systems and can be significant for those who use information systems. Researches showed that doctors, nurses, and other staff of administrative and financial sectors are most related with the data (5) and they should achieve them in the least time possible. Finally, it can be stated that, the point of view of users of hospital information systems play an important role in the successful functioning of the systems in the health structure of the country and its application can dramatically result in improved performance, reduced costs, providing more time for direct patient care and ensuring a better relationship among patients, nurses, doctors and other medical staff. With regard to the importance of the data and need to rapid access of correct and complete data, the present study was done in 2017 aiming to evaluate the hospital information system function from the perspective of users of Kowsar and Amiralmomenin hospitals, Semnan University of Medical Sciences in Iran.

## 2. Materials and Methods

After collecting the data and to analyze them, questions responses are scored based on Likert 5 scale from very low (score 1) to very high (5). Also the validity of this instrument was determined based on the concepts in the valid scientific literature (16-13) and receiving the opinion of experts and the questionnaire reliability was examined through the calculation of internal consistency. For this purpose the questionnaire was given to 10 subjects that after the collection, the Cronbach's alpha for it was obtained as ( $\alpha = 0.817$ ) and finally, analysis of data was performed using descriptive statistics and inferential statistics by SPSS version 19. The level of significance was set at 0.05.

## 3. Results

83 questionnaires (97.6 %) were collected out of 85 questionnaires distributed. 77.1% were females and 22.8% were male. Level of education of subjects included 2 patients (2.4%) Master's Degree, 51 (61.4 %) Bachelor's degree, 15 (18 %) Associate and 15 (18%) had Diploma and average work experience of staff in hospital was ( $3.1 \pm 12.7$ ) years. 17 subjects (20.4%) were less than 30 years old, 61 (73.4%) were in the age range 30 to 40 years and 5 (0.6%) were higher than 40 years and the average age of the respondents was ( $6.3 \pm 33.9$ ).

The results are shown in Table 1 that the majority of users who had a diploma had low and poor awareness in the HIS system, while users with an associate or Bachelor had a good and high awareness on the HIS system. Using one-way ANOVA, significant relationship between the levels of awareness of users about the hospital information system with education level was observed ( $P=0.001$ ).

Table 1: Users' awareness in terms of education about hospital information system applications

Index of awareness status	Diploma		Associate		Bachelor's degree		Master's Degree	
	N	%	N	%	N	%	N	%
Very low	3	20.0	0	0	0	0	0	0
Low	11	73.3	0	0	4	7.8	0	0
Average	1	6.6	1	6.6	9	17.6	1	50.0
High	0	0	12	80.0	31	60.7	1	50.0
Very high	0	0	2	13.3	7	13.7	0	0

Table 2: Frequency distribution of users' views on the use of hospital information systems

HIS Performance	1	2	3	4	5
Ability to control and correct the data after entering and before processing	32.5	39.7	14.4	3.6	9.6
The support of system of guidelines such as ICD10	74.6	19.2	6.0	0	0
Increasing statistics extraction rate and reporting	20.4	50.5	4.8	10.8	13.2
Increasing the rate of daily activities	30.1	27.7	20.4	10.8	10.8
HIS share in the strategic medicine, nursing, administrative management goals	48.1	14.4	32.5	3.6	1.2
Better performance of accreditation and audit activities	73.4	15.6	4.8	4.8	0
Increasing accuracy of staff in performing daily affairs	34.9	40.9	14.4	0	9.6
Increasing security coefficient of patient information	27.7	50.5	13.2	6.0	2.4
Better interactions with the extra organizational centers	22.8	27.7	30.1	10.8	8.4
Simplicity of the operations (system user-friendly)	19.2	2.4	15.6	31.3	31.3
Promotion of quality of patient care	15.6	4.8	24.1	32.5	22.8
Reduction of costs and preventing source waste	12.0	20.4	25.3	24.1	18.0
Reduction in medical, diagnostic and medication errors	52.1	31.0	12.0	2.4	2.4
Increasing hospital income	20.4	31.3	26.5	13.2	8.4
Helping to access a proper diagnosis	66.2	16.8	6.3	6.0	7.2
Helping to control and supervise the staff	31.3	19.2	31.3	15.6	2.4
Reduction in man force	8.4	15.6	25.3	28.9	21.6
Better rotation of records data and requests among the care team members	49.3	14.4	32.5	6.3	0
Ability to comply with the manual system	25.3	48.1	13.2	8.4	4.8
Available to patient information for research	27.7	55.4	14.4	0	2.4

1: Veryhigh; 2: High; 3: Average; 4: Low; 5: Very low.

71.4% of respondents had good and excellent computer skills. 69 patients (83.1%) considered learning how to use the system that was participated before launching by experts as good. The most weight average was related to the improvement of data exchange among sectors ( $0.965 \pm 3.78$ ), reduction of staff travel among sectors ( $0.820 \pm 3.98$ ) and instant access to patient records ( $0.884 \pm 4.14$ ). Also 66.7% of people stated that the HIS implementation reduced bureaucracy and paper savings compared to the before.

#### 4. Discussion

Due to the advancement and wide developments in the field of information technology and increasing patient expectations, increasing demand for use of hospital information systems have emerged in hospital, in the twenty-first century hospitals lacking this system did not have the ability to compete with other hospitals. (21) Hence, it can be said that knowledge and understanding of users is the essential key to the implementation of hospital information systems. It is emphasized the importance of user in acceptance of information technology projects (19, 20). Columbus in his study has obtained the average

participants' knowledge and attitudes towards electronic health records prior to the workshop 58% and 64% respectively that at the end of the period it increased to 72% and 78%. His study showed that training health care providers to be more familiar with electronic health records is an important factor in the success of the system (18). These results are consistent with some of the research findings.

One of the most important factors in implementing and launching hospital information systems is its user-friendly and ease of access to various parts of a system that would motivate the users. Results showed that the majority of users were relatively dissatisfied with the hospital information system to be user-friendly and its impact on some of their work activities and very few were satisfied. Unlike the results of the study by Ebadi Azar et al., at the Semnan Amiralmomenin hospital, 66 (55%) of employees were relatively satisfied with ease of access to information and various parts of the system and also its being user friendly and 29 (24%) were very satisfied (9). Also in a similar study, 95% of nurses were agreed to have easy access to the information in this system (22).

Hospital information systems designers should provide easy access to electronic records of patient and medical data for authorized users and also, prevent the entry of unauthorized users and disclosure of patient information with security measures. In the study by Azizi et al, in educational hospitals in Kermanshah, 32.5% of users were satisfied with the security of HIS information security that the high information security does not undermine the confidentiality of information and manipulation of the data (12). In a study by Littlejohnset al., he concluded that the hospital information system safeguards the confidentiality of information, standardizes management processes and increases the income of the hospital (6). These results are consistent with the findings of the present study.

In the present research, the users considered the implementation of hospital information system to reduce bureaucracy, reduce waiting time, and reduce errors and accuracy that is consistent with the findings of the research results by Ebadi Azar et al., (9) and Amiri et al., (23).

Hospital information systems are able to have the flexibility, high performance and speed. In the present study 57.8% of users expressed that the speed of performing daily activities is high and 20.4% expressed it to be average. In a study by Gholamhoseini et al., (21) in Imam Reza hospital, the results showed that 64% of users were satisfied with the system and they believed that 55% of the functionality required exists in software and on the other hand, 45% of the essential features in the software as a big problem. Also, 70% of users considered the rate of the systems as appropriate.

## 5. Conclusion

Due to the advancement and wider developments in the field of medical information technology and increasing patient expectations, increasing demand to use hospital information systems have emerged in hospital. Hospitals that have not such systems in the twenty-first century will not have the ability to compete with other hospitals. Hence, it can be said that knowledge and understanding of users is the first key to the implementation of hospital information systems.

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